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PULP & PAPER

May 19

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Number 5

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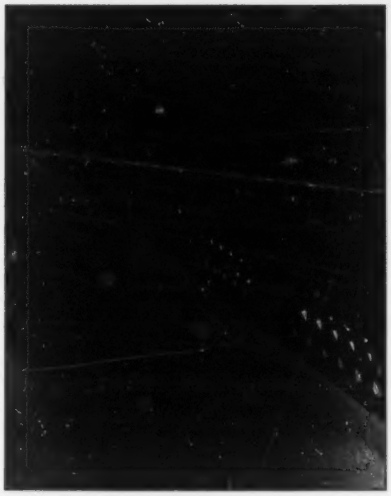

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This issue's dual focus includes five articles on the industry's latest pressing and drying techniques as well as seven features on current coating technology and trends. **(Photo of gas-fired infrared dryer on No. 3 paper machine at Wausau Paper's Brokaw, Wis., mill courtesy of Wausau Paper Mills Co.)**

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Atlanta: 2000 Powers Ferry Center, Suite 450 Marietta, Ga. 30067; (404) 952-1303; Fax (404) 933-0666
Chicago: 35 E. Wacker Drive, Chicago, Ill. 60601; (312) 372-6238; Fax (312) 372-3864
San Francisco: 500 Howard Street, San Francisco, Calif. 94105; (415) 397-1881; Telex 278273; Fax (415) 543-0256
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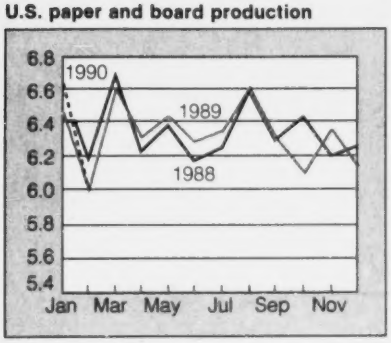
ABP

BPA

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.1 million tons in February, an increase of 1.4% over last year, according to the American Paper Institute. Most of the gains were in the paper sector, where production rose 2.5% to a seasonally adjusted rate of 39.2 million tpy. The seasonally adjusted rate of paperboard production dipped 0.2% in February to 38.2 million tpy.

Among major grades, shipments of printing and writing paper were up 2.4% in the first two months of 1990 from a year earlier, led by strong growth in groundwood paper. Newsprint has picked up strongly as well, with production up 11.6% through February and shipments up 13.7% compared with last year. Containerboard production for domestic use was off 0.1% from last year, while production for export rose 4.8%. Boxboard output rose 0.5% for domestic use and 16.0% for export.

Canadian newsprint shipments totaled 718,000 metric tons in February, down 1.8% from a year earlier, according to the Canadian Pulp & Paper Assn. Operating rates stood at 94%, down from 99% last year. Woodpulp shipments totaled 611,000 tons for the month, down 7.8%, with operating rates falling from 95% in 1989 to 91% this year. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Feb.	510	14.6	6,378	11.6
Uncoated groundwood (s)	Feb.	145	9.0	1,812	6.8
Coated paper (s)	Feb.	569	3.5	7,262	2.2
Uncoated free-sheet (s)	Feb.	903	0.8	11,386	1.9
Other printing/writing	Feb.	124	4.2	1,566	7.1
Total packaging and other paper (s)	Feb.	373	-8.8	4,726	-6.3
Tissue	Feb.	452	3.4	5,562	2.5
Total paper	**Feb.**	**3,077**	**2.9**	**38,683**	**2.6**
Unbleached kraft paperboard	Feb.	1,538	1.1	19,328	1.4
Semichemical medium	Feb.	430	-2.3	5,618	-2.1
Bleached paperboard	Feb.	356	4.4	4,439	1.5
Recycled paperboard	Feb.	671	-3.3	8,473	-1.9
Total paperboard	**Feb.**	**2,993**	**-0.1**	**37,757**	**0.1**
Total U.S. paper and paperboard output	**Feb.**	**6,070**	**1.4**	**76,441**	**1.4**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	Jan.	5,483	0.3	65,800	0.4
Market pulp production	Jan.	771	-0.8	9,247	-0.8
Wastepaper consumption at paper/board mills	Jan.	1,767	12.4	21,208	6.7
Pulpwood consumption (cords)	Jan.	8,553	6.4	102,636	2.3
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft²)	Feb.	24.544	1.5	52.076[6]	2.6
Containerboard inventories at U.S. box plants and mills	Feb. 1	2,705	-0.1		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	Jan.	1,113	4.7	13,367	4.4
Imports of Canadian newsprint	Jan.	595	-12.9	8,339[6]	4.2
U.S. paper exports (including products)	Jan.	581	32.3	6,974	32.6
Exports of unbleached kraft linerboard	Jan.	220	37.5	2,634	37.4
Exports of woodpulp	Jan.	420	-8.1	5,041	-8.1
Norscan pulp inventories[4]	Feb. 28	1,475	65.7		
Norscan pulp operating rates[4]	Feb.	94%	96%	86%	93%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Feb.	718	-1.8	1,434[6]	-4.0
Operating rates	Feb.	94%	99%	94%	99%
Inventories held by U.S. consumers	Feb. 28	1,297	-10.4		
Other paper/board shipments	Feb.	555	4.9	1,166	8.6
Woodpulp shipments (export only)	Feb.	611	-7.8	1,224	-3.9
Operating rates	Feb.	91%	95%	92%	96%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Coated groundwood: Inventory workdowns cut into deliveries, prices

Grade structure: Coated publication paper is classified as groundwood if it contains 10% or more mechanical pulp, with the balance made up of chemical pulp and fillers. Coated groundwood's share of all coated paper was about 56% in 1989, down 1% from 1988. Increasing demand for higher-value paper reduced No. 5 from 85% of all coated groundwood to 83% in 1989. The rest is the No. 4 grade, which has higher brightness and usually heavier basis weights. No. 5 is valued for its lighter basis weights and runability.

Basis weights for coated groundwood paper usually run from 32 lb to 50 lb (25 × 38 in. in reams of 500 sheets). Some 30-lb and 70-lb paper also is made. Coating weight on lightweight coated (LWC) paper may be about 30% of total sheet weight.

Lower-end coated groundwood paper competes with uncoated groundwood, particularly supercalendered, while higher-end paper may compete with coated free-sheet grades. End uses include advertising inserts and flyers, consumer and trade magazines, Sunday newspaper supplements, catalogs, direct mail, and other commercial printing.

Production/capacity: Coated groundwood production dropped about 3.8% in 1989 from 1988. This is due primarily to the workdown of inventories that customers had built in anticipation of price increases in late 1986 through 1988.

Almost 500,000 tpy of new coated groundwood capacity was brought online in 1989 from two new machines at Blandin Paper Co. (250,000 tpy) in Grand Rapids, Minn., and Repap Enterprises Inc.'s 230,000-tpy machine in New Castle, N.B. (this is a swing machine between coated groundwood and coated free-sheet).

Canadian coated groundwood paper capacity jumped from about 430,000 short tpy in 1989 to 573,000 tpy in 1990. The American Paper Institute said U.S. coated groundwood capacity was almost 4.5 million tpy in 1989, rising to slightly over 4.6 million tpy in 1990.

Because of overcapacity, a number of mills have postponed decisions on further expansion (*P&P*, Jan. 1990, p. 35). Among the machines probably delayed are a second machine at Blandin; Repap at Prince Rupert, B.C., or The Pas, Man.; Fraser Inc. at Edmundston, N.B., or Madawaska, Maine; and Bowater Inc. at Calhoun, Tenn. In addition, the proposed joint venture between Great Northern Nekoosa Corp. and MD Papier GmbH of Fed. Rep. Germany for a coated groundwood mill near Millinocket, Maine, has been at least put on hold pending a review by Georgia-Pacific Corp., which is acquiring GNN.

Boise Cascade Corp. is proceeding with a new 290,000-tpy machine at Rumford, Maine, due for startup in 1993. In addition, Pentair Inc. upgraded its publication paper mill in Niagara, Wis., adding 40% more coated groundwood capacity, bringing the mill rating to 320,000 tpy, and adding a Tampella pressurized groundwood system.

Coated groundwood is also affected by increased capacity in high-end uncoated groundwood grades.

Outlook: Inserts and coupons growth may slow down. Inserts primarily use coated groundwood (about 783,000 tons in 1988) and newsprint (720,000 tons in 1988), according to Andover International Association.

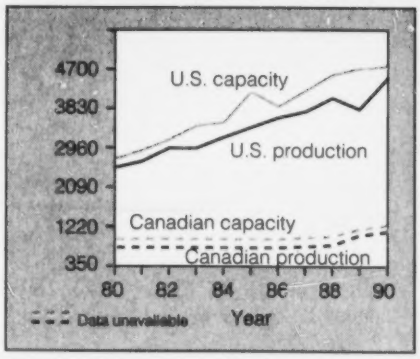
Magazines continue to do relatively well. Catalogs and other commercial printing (direct mail, circulars, annual reports, etc.) may remain solid.

One analyst said coated groundwood shipments could rise 8.3% in 1990 from last year. But operating rates will hover around 90% in 1990, the same as in 1989.

Prices: Discounting, sometimes heavy, was reported during 1989 as printers and publishers worked off inventories. Prices probably will remain at current levels throughout the year, though some producers hope to implement a price increase.

Historical transaction pricing trends ($/short ton, year-end, except 1990, which is first quarter) are: for No. 5, 34-lb roto paper, 1982, $760; 1983, $782; 1984, $890; 1985, $931; 1986, $860; $1987, 890; 1988, $990; 1989, $990; 1989, $960.

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	1988[3]	1989[3]	1990e
Production[1]	4,159	4,001	4,141
Capacity[1]	4,347	4,467	4,607
Utilization rate	96%	90%	90%
Imports[e]	507	497	522
Exports[e]	46	116	121
Apparent U.S. consumption	4,620	4,382	4,542
lb/capita	26.48	27.08	28.32
GNP ratio	1.62	1.63	1.68
Canada			
Production[2]	365	377	501
Capacity[2]	380	430	573
Utilization rate	96%	88%	87%
Exports[2,4]	207	422	561
Canadian consumption[2]	202	190	207

e = *Pulp & Paper* estimate. 1. American Paper Institute; 1990 *P&P* estimate. 2. Canadian Pulp & Paper Assn. for 1988 and 1989. 3. Revised. 4. More than 95% shipped to U.S.

TOP NORTH AMERICAN PRODUCERS

	Annual capacity (000 short tpy)	Market share (%)
1. Champion Papers[1]	689	13.3
2. International Paper Co.[2]	645	12.5
3. Consolidated Papers Inc.[2]	580	11.2
4. Repap Enterprises Corp.	520	10.0
5. Boise Cascade Corp.	390	7.5
6. Mead Corp.	335	6.5
7. Blandin Paper Co.	311	6.0
8. James River Corp.	315	6.1
9. Pentair Inc.[3]	220	4.2
10. Noranda Forest Inc.	194	3.7

Market share of top five companies: **54.5%**

Market share of top ten companies: **81.1%**

Total North American capacity/yr (1990): **5,180**

U.S.: 4.607 million short tons

Canada: 573,000 short tons

1. 1990 production. 2. *P&P* estimate. 3. Niagara of Wisconsin studying upgrade to 300,000 tpy.

Sources: Company data; *Pulp & Paper Forecaster*, Dept. of Commerce; API; CPPA.

Recycling Capacity to Increase at Record Rates as Laws Proliferate

The paper industry will have to adjust over the next several years to major changes in markets and technology as public opinion shifts to a preference for recycled products

By DEBRA A. GARCIA, Senior News Editor

As recently as five years ago, wastepaper was considered to be primarily a lower-cost alternative to woodpulp. While it still retains this distinction, some other benefits have been added in recent years. Especially in the U.S., laws are being adopted to encourage consumers to buy more recycled paper and paperboard products. The paper industry has been responding to these market pressures with planned expansions in recycled fiber. In the 1990s, recycling is likely to be one of the most predominant concerns for this industry.

The North American paper industry is planning more than 60 projects involving secondary fiber processing plants, 50% more than a year earlier, according to an October 1989 *Project Report* (Table 1). Projects at paperboard mills remain the most common, but expansions in recycled tissue and newsprint have grown the fastest. Eighteen secondary fiber projects were listed in 1989 for newsprint mills, up from just six a year earlier; 15 projects were planned at tissue mills in 1989 compared with six in 1988.

This report was prepared with the assistance of Jaakko Pöyry Oy, which has recently completed a major multiclient study, "Recycled Fiber, An Underutilized Opportunity."

Cover photo courtesy of Perry H. Koplik & Sons Inc.

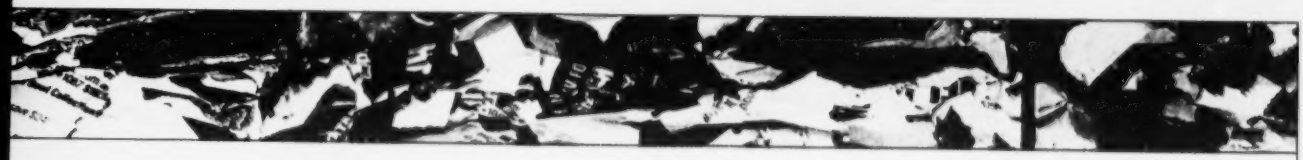
WASTEPAPER GROWTH. In a special wastepaper survey conducted last November by the American Paper Institute (API), U.S. papermakers told the U.S. trade association that their future plans would account for a consumption level by 1995 of 31.4 million short tons of wastepaper—mostly old corrugated containers (OCC) and old newspapers (ONP). This means a 50% increase in usage over the 20 million short tons reached in 1988.

API reported in its 1989 Capacity Survey that recycled fiber capacity would grow at twice the rate of woodpulp capacity over the next three years. Consumption of wastepaper in the manufacture of paper and paperboard will rise from an estimated 20.9 million short tons in 1989 to nearly 25 million short tons in 1992 (Tables 2 and 3). This rate of growth will average 6.2% annually through 1992, raising the percentage of wastepaper used by the industry to 27.2% by 1992 from 25.4% in 1989. Woodpulp consumption will drop to 72.8% of fiber supply from 74.6%.

During the first eight years of the 1980s, the paper and board industry's use of wastepaper worldwide grew by 50%, while its dependence on this recycled material source increased steadily, according to Jaakko Pöyry Oy. In its recently released study, "Recycled Fibre, An Underutilized Opportunity," the firm projects that worldwide use of recycled fiber will continue to grow. It expects global consumption of wastepaper to have passed the 100-mil-

Wastepaper processing projects at U.S. and Canadian mills.

Start date	Cost ($ million)	Company, mill site	Additional information (capacity figures in metric tons)
U.S.			
1989	3.8	Atlas Tissue, Hialeah, Fla.	Tissue expansion with new deinking line sized to accommodate a future third paper machine
1990		Augusta Newsprint, Augusta, Ga.	Install new 90,000-tpy deinking plant
none	—	Bear Island, Ashland, Va.	Install deinking facilities once a pattern of recycling laws and market needs is established
1991	—	Bowater, Calhoun, Tenn.	Build new deinking facility at Bowater Southern newsprint mill
1991	11.0	Champion, Roanoke Rapids, N.C.	Install processing plant for old corrugated containers
1990	148.9	Chesapeake, Menasha, Wis.	New deinking line; part of 80,000-tpy tissue expansion which includes new paper machine
1990	20.0	Chesapeake, West Point, Va.	Replace high-density dispersion and screening equipment in secondary fiber plant to reduce contaminants and improve quality; adds 125,000 tpy to capacity
1989	—	Converters, Rockford, Mich.	Install Black Clawson Lo-density pulping system to upgrade wastepaper cleaning system
1989	4.3	Corrugated Services, Forney, Texas	Expand recycled medium capacity 50%; includes two 34-in. refiners, cleaning equipment
1992	200.0	Daishowa, Stockton, Calif.	Build new 350,000-tpy recycled containerboard mill with state-of-the-art secondary fiber technology; joint venture partner is Trans-Rim Ltd.
none	—	Daishowa, Port Angeles, Wash.	Considering production of directory paper as light as 20 lb with 30% recycled fiber
1988-90	—	Federal Paper Bd., Sprague, Conn.	Stock cleaning upgrade with seven Black Clawson Ultra screens to process ONP, OCC
1991	125.0	Fort Howard, Rincon, Ga.	Fourth recycled tissue machine installation includes fiber processing expansion
1989	62.0	FSC, Alsip, Ill.	New 80,000-tpy recycled tissue mill, with stock preparation system from Bird Escher Wyss
none	20.0	FSC, Alsip, Ill.	Supplement washing system at recycled newsprint mill with flotation to handle new wastepaper grades to be collected for adjacent new tissue mill
1989	0.6	Garden State, Garfield, N.J.	Replace washed news chest agitator; add pulper scavenger system
none	—	Garden State, Northeast U.S.	Studying construction of a greenfield recycled newsprint mill for U.S. northeast
1989	—	Gaylord Container, Antioch, Calif.	Black Clawson stock cleaning and screening system for mill upgrade
1989-91	35.0	Golden State, Pomona, Calif.	Two-year mill upgrade includes washing and screening improvements in deinking plant
none		Golden State, Pomona, Calif.	Studying addition of a new recycled newsprint machine, which would require additional deinking capacity; expanded mill would use up to 400,000 tpy of ONP
none		Great Northern, East Millinocket, Maine	Add 250,000-tpy deinking plant for recycled newsprint production
1989	25.0	Great Southern, Cedar Springs, Ga.	Modifications to boost recycled fiber usage in linerboard by 15,000 tpy
1989	—	Green Bay Pack., Green Bay, Wis.	Expand, modernize secondary fiber system for 350-tpd semichemical medium expansion
1990	—	Green Bay Pack., Morrilton, Ark.	Upgrade secondary fiber system for 350-tpd kraft linerboard expansion program
1989	—	Hyde Park Paper, Hyde Park, Mass.	Restarted idle mill to produce recycled fine papers on one machine
1990	35.0	Inland Container, Newport, Ind.	Recycled medium expansion; includes new pulper, refiners and cleaners for wastepaper
none	—	Intl. Paper , Riegelville, Pa.	Restart 375-tpd recycled containerboard mill; includes modernization of fiber system
1989	26	James River, Green Bay, Wis.	Build a secondary fiber plant to replace some sulfite capacity, adhere to discharge limits
none	—	James River, Halsey, Ore.	Studying a secondary fiber plant to supply tissue and communication paper mills in Halsey, Clatskanie, Ore., and Camas, Wash.
1991	—	Kenaf North Am., Muskogee, Okla.	Build new 750-tpd recycled linerboard mill
1989	150	Kimberly-Clark, Jenks, Okla.	Construct 68,000-tpy tissue mill; furnish will be combination of pulp and recycled fiber
1990	—	Kimberly-Clark, Loudon, Tenn.	Construct new tissue mill, about half the size of Jenks mill; furnish is pulp, recycled fiber
1989	12.5	Longview Fibre, Longview, Wash.	Construct new 300-tpd secondary fiber plant with pulping, screening and cleaning system for OCC from Black Clawson
1991	66.0	MacMillan Bloedel, Pine Hill, Ala.	Containerboard mill modernization includes changes to increase use of recycled fiber
1989	20	Macon Kraft, Macon, Ga.	Expand and modernize wastepaper pulping; part of quality program and liner expansion



Start date	Cost ($ million)	Company, mill site	Additional Information (capacity figures in metric tons)
U.S.			
1991	35.0	Menasha, Otsego, Mich.	Corrugating medium expansion; includes new wastepaper processing system to expand secondary fiber usage form 40% of total furnish to 50%
1990	66.0	Mi Ho Paper, St. Joseph, Mo.	Construct new fine paper mill furnish will be market pulp and recycled fiber
none	—	Mosinee, Cheboygan, Mich.	Install deinking facility at newly purchased mill for tissue expansion
none	480.0	Northampton Pbd, Northampton, Pa.	Proposed 300,000-tpy recycled linerboard mill
1991	300.0	North Pacific, Longview, Wash.	Newsprint expansion; new 180,000-tpy deinking plant will allow production of recycled news, supply 80% of additional fiber for new machine, and 25% of overall mill needs
1989	—	Putney Paper, Putney, Vt.	Install two new Voith Morden pulpers and Sulzer Escher Wyss deinking cells and screening equipment for tissue expansion
1990	14.0	Recycled Paper Board, Clifton, N.J.	Reopen mill to produce 200 to 300 tpd recycled board from up to 400 tpd of wastepaper
none	—	Smurfit, Fernandina Beach, Fla.	Expand secondary fiber facilities for 600-tpd recycled containerboard machine restart
1990	—	Smurfit Newsprint, Newberg, Ore.	Install flotation deinking system to enable use of magazine stock in recycled news furnish
none	—	Smurfit Newsprint, Northeast U.S.	Studying feasibility of building a new 255,000-metric-tpy recycled newsprint mill, to consume 300,000 tpy of wastepaper
1989	—	Smurfit Newsprint, Oregon City, Ore.	Flotation deinking system to enable mill to use magazine stock in recycled new furnish
1989	300.0	Southeast Paper, Dublin, Ga.	Newsprint expansion; includes Black Clawson 1,500-tpd Hydrapulper deinking system with 900 tpd cleaning and screening
1989	18	Stone Container, Uncasville, Conn.	Paper machine rebuild and recycled fiber system upgrade; adds 60,000 tpy medium
none	100	Trans Rim, Dunkirk, N.Y.	Proposed 200,000-tpy recycled containerboard mill, to process 220,000 tpy OCC
1989+	—	Virginia Fibre, Riverville, Va.	Install new 500-tpd Beloit Jones recycled fiber system at medium mill
1989	—	Visy Recycle, Hartford City, Id.	Restart shutdown 3M mill to produce 150 tpd of recycled medium
1991	30.0	Weston, Terre Haute, Ind.	Corrugating medium expansion; includes OCC recycling expansion with new refiners and repulper to improve stock cleaning and processing
Canada (C$ million)			
1989	—	Atlantic Packaging, Whitby, Ont.	New 185,000-tpy recycled newsprint and tissue mill; furnish will be 65,000 tpy of computer printout and ledger for tissue and 165,000 tpy of old newspapers for newsprint
1991	80.0	Balaclava Enterprises, Vancouver, B.C.	New 122,500-tpy market deinked pulp mill
1991	75.0	Canadian Pacific, Thunder Bay, Ont.	Install deinking plant to supply 237,500-tpy recycled newsprint output
1990	20.0	Cascades, East Angus, Que.	Install new 60-tpd deinking plant at boxboard mill to allow use of higher wastepaper grades
1989	30.0	Cascades, Kingsey Falls, Que.	Tissue expansion; includes new deinking line
none	100.0	Cascades/Steinbeis, East Angus, Que, or Niagara Falls, N.Y.	Joint venture to produce 100,000 tpy of recycled computer printout paper from 120,000 tpy of ONP; either location would require a new deinking plant
none	—	Daishowa, Quebec City, Que.	Considering use of recycled fiber in newsprint furnish
none	65.0	Donohue, unspecified location	Build 80,000-tpy deinking plant at Clermont, Que., or Montreal, Que.
none	75.0	Fletcher, undecided location, B.C.	Considering secondary fiber plant for Elk Falls or Crofton; both washing and flotation systems are under study
none	100.0	Fraser, Thorold, Ont.	Studying new 272-tpd deinking plant to boost secondary fiber use from current 23,000 tpy
none	53.0	Kruger, Bromptonville, Que.	Add deinking plant for recycled newsprint production
none	75.0	Mac. Bl., undecided location, B.C.	Build new 200- to 300-tpd deinking plant at Port Alberni or Powell River for recycled news
1991	45.0	Perkins Papers, Candiac, Que.	Tissue expansion with new paper machine, new deinking line
1991+	24.0	Quebec & Ontario, Thorold, Ont.	Convert washing deink plant to flotation and install post refining in flotation
1990	31.0	Scott, Crabtree, Que.	Build new 65-tpd secondary fiber line; boosts recycled fiber capacity to 165 tpd
none	—	Soucy, Riviere-du-Loup, Que.	Install deinking facilities once a pattern of recycling laws and market needs are established
1991	—	Stone-Consolidated, unspecified location	Add deinking at one of its Canadian mills

TABLE 2: **U.S. wastepaper demand, 1988 and 1995 (million short tons).**

Wastepaper grade	1988 Actual demand	1988 Recovery rate (%)	1995 Projected demand	1995 Recovery rate (%)
Old newspapers	4.8	34.8%	8.0	51.6%
Corrugated	12.4	51.6	18.8	66.0
Mixed	2.9	13.0	4.1	15.0
Pulp substitutes	3.6	100.0	4.0	100.0
High-grade deinking	2.5	37.0	4.4	50.0
Total	**26.2**	**30.6%**	**39.3**	**38.5%**

Source: Franklin Associates Ltd.

lion-metric-ton mark by 1996 and to reach 130 million metric tons by the end of 2001, the period its forecast covers.

Worldwide, close to 75 million metric tons of recycled fiber were used in paper and paperboard manufacture in 1988, accounting for almost one-third of the total papermaking fiber needs of the industry (Figure 1). In 1989, 27.6 million short tons of wastepaper were collected for recycling in the U.S. Of this, 21.3 million short tons were used by the U.S. paper industry and 6.3 million short tons were exported.

GRADES VARIED AND COMPLEX. Wastepaper is also referred to as paperstock, secondary fiber, and recyclable paper. Mixed paper, ONP, OCC, pulp substitutes, and deinking are the five official wastepaper grade categories used by the Dept. of Commerce and are generally accepted by the industry as the key benchmarks for numerous other grades. The Paper Stock Institute of America subdivides these five groups into more than 80 definitive grades with precise specifications that are periodically reviewed and updated.

The grade characteristics are as follows:

- Mixed paper: includes paper of varied quality, often office waste, as well as boxboard cuttings and mill wrappers.
- ONP: includes old newspapers, either collected from households or overissues at newsstands or inplant; also groundwood paper trim.
- OCC: includes used corrugated containers as well as container plant cuttings.
- Pulp substitutes: includes unprinted grades of brown and colored kraft, tabulating cards, white and semibleached sheets and cuttings, and shavings or trim of unprinted grades.
- Deinking: includes the deinking grades of white and colored ledger, computer printout (CPO) paper, coated book and groundwood paper, and bleached sulfate sheets and cuttings.

The demand for recycled fiber worldwide has grown fast—twice as fast as the demand for virgin fiber pulp (5.0% annually vs 2.5% annually during 1970-88), according to Jaakko Pöyry. In the U.S., results of API's 1989 Capacity Survey indicate that the U.S. industry's use of wastepaper will grow twice as fast as its consumption of woodpulp over the next three years, according to Richard E. Storat, API's vice president-economic and financial services.

Projected 1991 U.S. paper industry consumption of wastepaper will reach 23.7 million short tons, according to the latest API survey. Just a year earlier, the same survey results had reflected that consumption would be 23.0 million short tons—a

As more municipalities adopt waste-reduction laws, more households will be separating their recyclables before disposal. (Photo courtesy of Browning-Ferris Industries.)

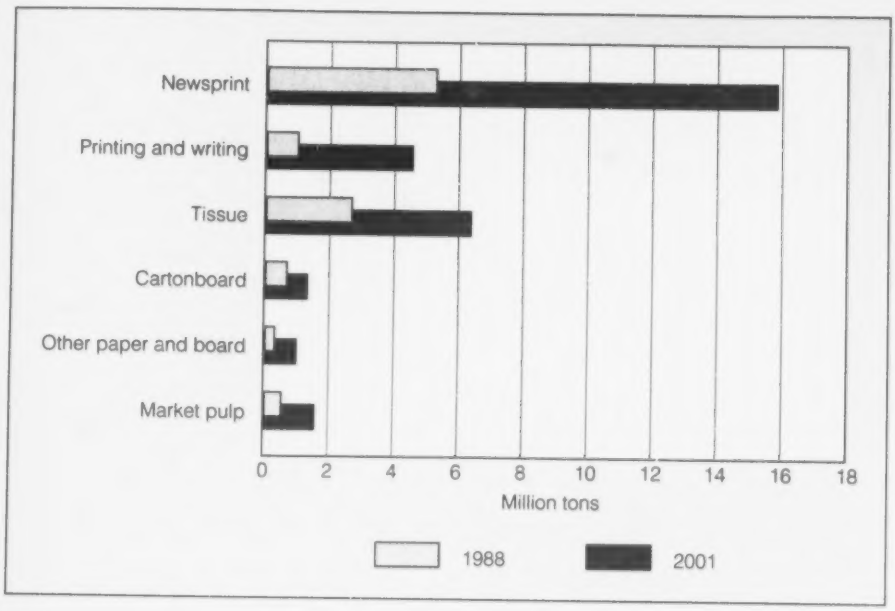


FIGURE 1: **World usage of deinked pulp, 1988 and 2001.**

boost of 714,000 short tons in projected expansions in surveys just one year apart. During the same period, planned 1991 woodpulp consumption is expected to drop by 2.3% to 65.1 million short tons.

LAWS SPUR DEMAND. Improvements in technology, scarcity of virgin fiber, and the incentive of a lower-cost fiber alternative have contributed to the growth in secondary fiber consumption. In recent years, however, environmental issues have been a significant catalyst. In the U.S., the landfill problem has caused lawmakers to look for alternatives, and recycling has proven to be the safest choice politically. The public is generally opposed to alternatives such as siting new landfills and incineration.

Laws preceding these, in the early 1980s, began to attack the solid waste problem by mandating municipal source-separation of recycled materials. A few years later, some of these public programs began to fail when more paper was generated than the market would accept. Now, legislators have come back to the table with bills to enhance markets that could consume the increasing generation of wastepaper. Legislation on waste reduction has been enacted in about 20 U.S. states, in many municipalities, and is in the pipeline in many more.

Typically, the laws cover source separation, procurement preference, and recycled content in newsprint. These laws include the following: 1) laws requiring consumers of newsprint to use recycled-fiber newsprint for a certain portion of their total requirements (Table 4), 2) federal, state, and municipal procurement policies favoring recycled materials, and 3) mandated source-separation of newspapers by households. This

TABLE 3: **Total U.S. wastepaper consumption, 1988-92 (000 short tons).**

	1988	1989[1]	1990[2]	1991[2]	1992[2]
Total all grades	**19,886**	**20,878**	**22,570**	**23,740**	**24,982**
Total paper	**5,650**	**5,960**	**6,596**	**7,087**	**7,397**
Newsprint	1,431	1,498	1,754	1,831	1,965
Printing, writing, and related	1,416	1,447	1,517	1,608	1,635
Packaging and industrial converting	265	253	253	255	259
Tissue	2,538	2,762	3,072	3,393	3,538
Total paperboard	**13,371**	**14,034**	**15,021**	**15,671**	**16,594**
Kraft, bleached, and unbleached	2,042	2,311	2,694	2,830	3,035
Semichemical	1,845	1,935	2,063	2,093	2,294
Recycled corrugating	2,081	2,165	2,343	2,436	2,483
Other recycled	7,403	7,623	7,921	8,312	8,782
Construction paper and board	**885**	**884**	**953**	**982**	**991**

1. Estimated actual consumption.
2. Estimated consumption of full capacity operations.
Source: API Capacity Survey, 1989.

follows a goal set by the Environmental Protection Agency (EPA) for a 25% reduction in solid waste by 1992.

On June 22, 1988, EPA issued the "Guideline for Federal Procurement of Paper and Paper Products Containing Recovered Materials," as required under section 6002 of the Resource Conservation and Recovery Act (RCRA) in an effort to stimulate demand for products made from materials recovered from solid waste. One year later, all of the federal government agencies responsible for procuring paper were required to give preference to recycled products, and state and local governments that purchase $10,000 worth or more using appropriated federal funds must also follow the EPA guidelines (Table 5).

CANADIAN INVESTMENT RISKY. In Canada, though, there is growing concern that recycled projects may be built more quickly than the supply of wastepaper can be generated. Canada recycles only about 10% of its wastepaper, compared with a U.S. recycling rate of about 24%.

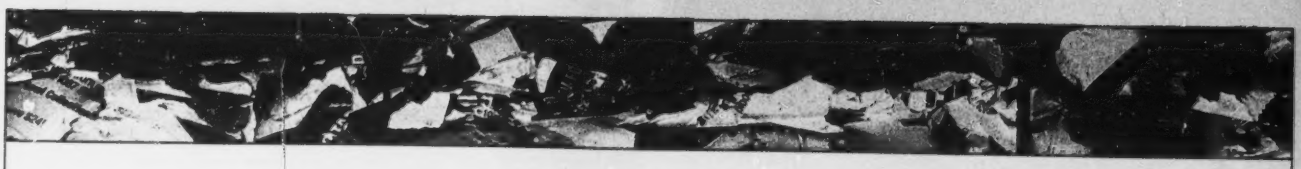
At the Candian Pulp & Paper Assn.'s (CPPA) annual meeting in January, Howard Hart, CPPA president, projected a shortage of ONP in Canada by the end of this year.

At the Canadian Pulp & Paper Assn.'s (CPPA) annual meeting in January, Howard Hart, CPPA president, projected a shortage of ONP in Canada by the end of this year. Hart noted that even if six out of ten old newspapers in Ontario—an estimated 340,000 metric tons—were to be collected for recycling, a shortage would still exist. Canadian mills would be forced to import the rest—undoubtedly from the U.S. CPPA has moved recycling from its environmental agenda to its economic agenda, noted John Houghton, president of Quebec & Ontario Paper Co. Ltd., which is the only current producer of recycled-content newsprint in Canada.

Reportedly, the Ontario Forest Industries Assn. said the amount of newspapers collected for recycling in Ontario reached 234,000 metric tons in 1988, when Toronto began to recycle. About 190,000 metric tons of ONP are used by Q&O.

Companies in Canada are also more skeptical than those in the U.S. about the long-term benefits of investing in recycled fiber equipment. Besides concerns about possible secondary fiber shortages, they are also uncertain about whether it would be feasible for many Canadian mills to use wastepaper, as these mills tend to be remote from metropolitan areas. Canadian producers have begun asking local and federal agencies for assurances of their commit-

The 1990s will see a trend toward harvesting the urban forests of wastepaper, which are most productive in large metropolitan regions. (Photo courtesy of Jefferson Smurfit Corp.)



ment to recycling and for financial assistance.

Cascades Inc. and Kruger Inc. earlier this year separately postponed plans involving recycling projects, pressuring the government to provide some support. In the meantime, across the border in New York, state officials are offering economic incentives if Cascades decides to go ahead with its plans at Niagara Falls, N.Y.

Still, other Canadian companies are forging ahead with recycled-fiber projects. Canadian Pacific Forest Products Ltd. plans to add deinking at its mills in Gatineau, Que., and Thunder Bay., Ont., and Abitibi-Price Inc. has publicly stated it will build deinking facilities in Canada but has not selected any sites yet.

Kruger wants to build a C$53-million deinking plant adjacent to its newsprint mill in Bromptonville, Que., while Cascades has been looking at several locations for a joint venture with Steinbeis & Consortium GmbH (P&P, Nov. 1989, p. 39). Using the Fed. Rep. Germany company's technology, a 100,000-metric-tpy recycled CPO and copier paper mill would use 100% ONP. Depending on where the mill is constructed, it could cost from C$40 to C$150 million.

Quebec reportedly is looking at a new program to encourage mills to use ONP and old magazines. This could include financial aid for new deinking plants. To qualify, deinking plants would have to draw at least 50% of their raw materials from

U.S. recycled newsprint legislation.

State laws	Fees or credits[2]	Consumption[3] Goal	Timetable	Status
California	Penalties not to exceed $1,000/violation	25%	1/1/91	Passed
		50%	1/1/2000	
Connecticut		20%	12,31,93	Passed
		90%	12/31/98	
Florida	10¢/ton tax until 10/92; 50¢/ton if goal not reached	50%	1992	Passed
Illinois				
H.B. 2912:	10¢/ton disposal fee		1991-93	Pending
H.B. 2458:	not to exceed $5,000		1/1/91	Pending
Kentucky		50%	7/16/91	Pending
		75%	7/15/92	
Louisiana	10¢/ton tax			Failed
Maine	Up to $1,000/violation	20%	12/31/93	Pending
		90%	12/31/97	
Maryland	$15/ton for every short of goal	12%	1992[5]	Pending
		40%	1998	
Massachusetts		20%	12/31/93	Pending
		80%	12/31/97	
Missouri				
H.B. 949:	10% of the cost/ton on virgin newsprint consumed	10%	1992	Pending
		50%	1996	
S.B. 513:		10%	1993[6]	Pending
		50%	1997	
Nebraska	$1/ton tax			Failed
New Jersey				
A. 627		45%	1990[4]	Pending
A.B. 4703		45%	12/31/89	Pending
		90%	1991	
New York				
S.B. 4504:	Paper not meeting requirement not to be sold in state		1991[4]	Pending
S. 6779:	$500 to $1,000/violation	11%	1/1/92	Pending
		40%	1/1/2000	
N. Carolina	10¢/ton tax			Failed
Oregon	$1/ton tax			Failed
Pennsylvania	2% reduction in state income tax if goal is reached	50%		Pending[4]
Rhode Island				
H.B. 7923:	Restraining order issued	20%	1993	Pending
		90%	1998	
S.B. 2053:	$20,000/day	10%	1/1/91	Pending
H.B. 8411:		50%	1/1/96	

Quebec. The province's Forestry Act may also be amended to require greater use of not only wastepaper but also woodchips in order to conserve forests.

In Alberta, the provincial Liberal environmental critic Grant Mitchell criticized the provincial government for attracting kraft pulp mills to the province while the North American trend is toward recycling.

In Canada, as in other areas of the world, future growth in recovery rates for wastepaper may not be as promising as it is in the U.S. (Recovery rate is the ratio of recovered fiber collected to paper and board consumed.) Much of what will be needed to meet future growth in world demand for secondary fiber will come from the U.S.

Jaakko Pöyry projects the worldwide recycled fiber utilization rate will increase to 41.0% in 2001 from 32.8% in 1988, assuming global consumption and production of paper and paperboard will grow an average of 2.6% (to 317 million metric tons from 226 million metric tons in 1988). The U.S. utilization rate will grow to 31.3% from 22.8% currently during this period (Table 6). (Utilization rate is the ratio of recycled fiber consumed to paper and board produced.)

WORLD GROWTH TIED TO U.S. While both Western Europe and Japan will be self-sufficient to a high degree (importing some better qualities mainly to reinforce the strength of the secondary fiber stream), the

State laws	Fees or credits[1]	Consumption[2] Goal	Timetable	Status
S. Dakota	10%/ton cost of virgin newsprint used short of goal	10% 50%	1992 1996	Pending
Vermont				
S.B. 326:		25%	7/1/91	Pending
H. 766:	10% of annual newsprint cost or formula based on "consumers recycling index"	90% 25%	7/1/95 7/1/93	Pending
Virginia	10¢/ton tax	10%	1/1/98	Pending
Washington				Failed
S.B. 6338:	Up to $1,000/violation	25%	1/1/92	Pending
H. 2562		50%	1/1/2000	
Wisconsin		10%	1/1/92	Pending
S.B. 300:	10% of total annual newsprint cost multiplied by recycling status	30%	1/1/2000	
Amendments:	Voluntary compliance	10% 50%	1991 1995	Pending
W. Virginia		5% 20%	1991[5] 2001	Pending
Federal laws:		25% 80%	1/1/93 1/1/96	Pending
S.B. 1763:	Credits for excess recycled newsprint made are transferable	10% 30%	1990 2000	Pending
S.B. 1764:	Credits for excess recycled newsprint made are transferable	10% 40%	1990 2000	Pending
H.B. ????:	(Esteban Torres, D-Calif.)	2% increase each year		

Note: Does not include preference purchasing provisions for government agencies. Includes states where legislation is most advanced.

1. Fees are generally taxes or penalties on virgin-fiber newsprint consumed. Credits generally apply to recycled-fiber newsprint used, and are usually used to offset taxes/penalties.
2. Applies to amount of total consumption that must be recycled-fiber based, unless otherwise noted. Ranges imply goals to be phased-in between these dates.
3. Goals are aggregate of recycled fiber consumed in proportion to total newsprint consumed by individual publisher.
4. State task force has proposed voluntary guidelines. (New York's proposal is to increase recycled fiber consumption gradually from 7% in 1990 to 40% by 2000. Pennsylvania publishers have agreed to use at least 50% recycled newsprint by 1995.
5. Goals are an aggregate of statewide recycled fiber consumed in proportion to total newsprint consumed. Compromise reached late in 1989 proposes to make all consumption goals voluntary and only applicable when recycled-fiber newsprint is available in the quantity, at the quality, and of competitive price to virgin-fiber newsprint.

Sources: American Newspaper Publishers Assn., American Paper Institute.

Far East, Canada, and Mexico will be major importers of wastepaper—and only the U.S. will have the potential to meet their needs as well as its own growing requirements.

The U.S. is by far the largest exporter of wastepaper, with shipments reaching a record 6.3 million short tons in 1989. Canada, meanwhile, gets most of its paperstock from the U.S., importing approximately 257,000 short tons last year.

API is projecting continued robust growth in U.S. exports of wastepaper for three main reasons. First, the recovery rates in many prime overseas markets are already reaching their limits, such as in Japan, where the collection rate has actually slipped; second, recycled fiber capacity is expanding worldwide; and, finally, U.S. long-fiber wastepaper is actively sought.

Demand for U.S. wastepaper exports could reach 11.0 to 14.2 million short tons by 1995, according to API estimates. This is based on moderate growth in paper and paperboard consumption outside the U.S. through the mid-1990s and the expectation that the weighted average wastepaper recovery rate for all countries except the U.S. edges up only slightly (Table 7).

Jaakko Pöyry expects that activity in U.S. wastepaper exports will include the following: 1) cross-Pacific trade from the U.S., 2) export of ONP (and also, possibly, magazines) from the U.S. to Canada, 3) export of high-quality OCC and deinking grades from the U.S. to Western Europe, and 4) trade within Western Europe and, later, from Western Europe to Eastern Europe.

"To meet total demand, both domestic and export new collection records will be set and the collection system will continue to expand," noted J. Rodney Edwards, vice president of API's paperboard group. API estimates world demand for U.S. wastepaper alone will reach about 40 million short tons by 1995, including the estimated 31.4 million short tons of U.S. consumption and 11 million short tons or more that will be exported from the U.S.

TABLE 5: **EPA minimum-content standards on major grades.**

Grade	Recovered materials (%)	Postconsumer recovered materials (%)	Wastepaper (%)
Newsprint	—	40	—
Printing/writing			
Offset printing	—	—	50
Mimeo and duplicator	—	—	50
Stationery	—	—	50
Office paper	—	—	50
Copier paper	—	—	—[1]
Envelopes	—	—	50
Form bond	—	—	—[1]
Book paper	—	—	50
Bond paper	—	—	50
Ledger	—	—	50
Cover stock	—	—	50
Cotton-fiber paper	25	—	—
Tissue			
Toilet tissue	—	20	—
Toweling	—	40	—
Napkin	—	30	—
Facial tissue	—	5	—
Doilies	—	40	—
Industrial wipes	—	0	—
Unbleached packaging			
Corrugated boxes	—	35	—
Fiber boxes	—	35	—
Kraft bags	—	5	—
Recycled paperboard			
Folding cartons and other	—	80	—
Pad backing	—	90	—

1. EPA found insufficient production of these papers with recycled content to assure adequate competition.
Source: E.H. Pechan & Associates Inc.

Postconsumer grades will constitute nearly 90% of the incremental tonnage required between 1988 and 1995, according to Franklin Associates Ltd. In a study done for API, the firm estimated that by 1995, the collection limits for ONP and OCC will be close to their maximum limits.

U.S. RECYCLING GOAL: 40%. API announced earlier this year that the U.S. paper industry had set a goal to collect and reuse 40% of total domestic production of paper and paperboard by 1995. Currently, the collection rate is 30%. API projects that the U.S. recovery rate in 1995 will be between 38.5% and 41.7% of new supply, which will generate material approximately in balance with projected demand.

EPA has established a procurement guidelines hotline to answer questions from government agencies, paper mills, merchants, and the public. Copies of the guidelines as well as lists of manufacturers and vendors of recycled paper products that meet EPA recommended standards can be obtained. The number is 703-941-4452.

A report recently released by the New York State Newspaper Recycling Task Force found that a 65% newspaper recycling rate is possible in the U.S. by the year 2000. By that time, New York State publishers say that they will voluntarily use recycled fiber for at least 40% of their total newsprint requirements. This would have a significant effect on Canadian producers, who now supply much of that consumption.

The report, which resulted from several months of study by the state government, newsprint industry representatives, the New York Newspaper Publishers Assn., and Andover International Associates (AIA), was done to find "realistically attainable" levels of recycled newsprint manufacturing capacity and to investigate steps to encourage investment in new or expanded recycled newsprint facilities.

By 1992, under expansion plans announced through late last year, North American recycled newsprint capacity will increase by approximately 375,000 short tons, which is just 18% of the total newsprint capacity expansions planned at that time. However, several more projects have been announced since the study was released, including those mentioned earlier (Table 8).

The growth in deinking capacity in the coming decade is expected to increase to 40% by 2000 from roughly 7% in 1988 (Table 9). According to figures from New York State's Dept. of Economic Development and AIA, a 65% ONP recycling rate in 2000 would mean that 10.2 million short tons of ONP will be diverted from the solid waste stream. This assumes a U.S. newsprint consumption figure of 15.8 million short tons.

No growth is expected to occur in newsprint consumption between 1988 and 1990. This, combined with the expansion of primarily virgin-fiber newsprint manufacturing capacity through 1992, could have a dampening effect on recycled newsprint expansions through 1995. Depending on the extent to which currently weak newsprint market con-

TABLE 6: **Wastepaper utilization in North America, 1988-2001.**

Grade	Paper and board production		Recycled fiber consumption		Utilization rate (%)	
	1988	2001	1988	2001	1988	2001
	(million metric tons)					
Newsprint	15.4	19.2	1.5	7.3	9.5	38.0%
Printing and writing paper	22.7	35.8	1.3	3.4	5.8	9.5
Tissue	5.5	7.0	2.3	3.8	41.6	55.0
Liner and fluting	25.3	33.9	6.2	12.7	24.5	37.5
Cartonboards	7.8	9.3	3.0	3.3	38.4	35.0
Other paper and board	10.0	10.1	5.5	5.5	55.0	55.0
Total	**86.7**	**115.2**	**19.8**	**36.0**	**22.8**	**31.3**

Note: A further 16 million tons of wastepaper will be used in North America by 2001. Liners and fluting medium will use an additional 6.5 million tons and the utilization rate in the corrugating material industry will rise significantly, from 24.5% at present to 37.5%. The use of wastepaper and board will increase in the production of testliner, kraft linerboard and fluting medium.
Source: Jaakko Pöyry Oy.

TABLE 7: **U.S. wastepaper exports (million short tons).**

	World paper/board consumption (except U.S.)	World recovery rate (%) (except U.S.)	World wastepaper recovery (except U.S.)	World wastepaper utilization rate (%) (except U.S.)	Potential U.S. exports
Actual					
1986	145.1	33.7%	48.9	53.0	4.1
1988	162.8	35.3	57.5	63.5	6.0
Projected					
1995					
(low)	193.5	36.0	69.7	80.7	11.0
(high)	207.1	36.0	74.6	88.8	14.2
Average growth					
1986-88	5.9		8.4	9.5	21.0
1988-95					
(low)	2.5		2.8	3.5	9.0
(high)	3.5		3.8	4.9	13.1

Source: *Pulp & Paper International*, with projections from American Paper Institute.

TABLE 8: **North American recycled newsprint projects, 1989-91.**

Company	Mill/location	Capacity[1] (metric tons)	Startup	Recycled content (%)
Announced				
Southeast Paper Mfg. Co.	Dublin, Ga.	215,000[2]	1989	95 to 100
Atlantic Packaging Corp.	Whitby, Ont.	136,100[2]	1990	100
Augusta Newsprint Co.	Augusta, Ga.	90,000[3]	1990	25 to 40+
North Pacific Paper Corp.	Longview, Wash.	230,000[2]	1991	25 to 40+
Canadian Pacific Forest Products Ltd.	Thunder Bay, Ont.	100,000[3]	1991	40+
	Gatineau, Que.	182,500[3]	1991	40+
Bowater Inc.	Calhoun, Tenn.	109,500[3]	1991	40
Stone-Consolidated Inc.	n.a.	n.a.[3]	1991	n.a.
Proposed				
MacMillan Bloedel Inc.	Port Alberni, B.C.	n.a.[3]	n.a.	n.a.
	Powell River, B.C.	n.a.[3]	n.a.	n.a.
Fletcher Challenge Ltd.	Crofton, B.C.	n.a.[3]	n.a.	n.a.
	Elk Falls, B.C.	n.a.[3]	n.a.	n.a.
Kruger Inc.	Bromptonville, Que.	n.a.[3]	n.a.	n.a.
Garden State Paper Co.	Northeast U.S.	n.a.[2]	n.a.	100
Smurfit Newsprint Corp.	Northeast U.S.	255,000[2]	n.a.	50+
	Newberg, Ore.	275,000[2]	n.a.	50+
Balaclava Enterprises	Vancouver, B.C.	122,500[3]	1991	n.a.
Great Northern Paper Co.	East Millinocket, Maine	250,000[3]	n.a.	40
Donahue Inc.	Clermont, Que.	n.a.[3]	n.a.	n.a.
Bear Island Paper Co.	Ashland, Va.	n.a.[3]	n.a.	n.a.
Atlantic Packaging Corp.	Whitby, Ont.	n.a.[2]	n.a.	100

1. Adding deinking capacity does not necessarily mean an increase in papermaking capacity.
2. New paper machines.
3. Deinking to be added to existing mills.

Source: *Pulp & Paper Week.*

ditions will affect growth in ONP use, demand could rise by 39% to 66% during 1988-95 and by 71% to 116% during 1988-2000, according to New York State's report.

PRICE INSTABILITY. Wastepaper prices are determined by a combination of demand and the ease with which supplies can be obtained. The actual relationship is hard to quantify, and it varies with the grade of wastepaper. There are also some important differences between countries. But in principal, the buyers, through their actions, set the price level. Mills are prepared to pay more to generate additional supplies but expect to pay less as their requirements are slowing down.

The main characteristic of wastepaper prices in all countries is their instability. Prices are highly cyclical, and their cycles follow the general paper and board industry; but the important divergence is in terms of price peaks and valleys, with wastepaper prices moving up and down long before paper and board produc-

TABLE 9: **North American newsprint and deinking capacity 1988-2000 (000 short tons).**

	1988		1992		1995		1997	2000
	Newsprint	Deinking	Newsprint	Deinking	Newsprint	Deinking	Deinking	Deinking
U.S. (23 mills—1992)								
Northeast	546	220	600	350	828	630		
North Central	180	180	350	250	425	340		
South Atlantic	1,057	220	1,310	450	1,562	785		
Sout Central	2,439	0	3,040	200	3,012	640		
Mountain/Pacific	1,881	592	2,500	750	2,568	820		
Total	**6,102**	**1,212**	**7,800**	**2,000**	**8,395**	**3,215**	—	—
Deinked as % of total		19.9%		26%		38%		
Canada (40 mills—1992)								
Maritimes	1,894	0	2,100	—	2,100	295		
Quebec	5,140	0	5,860	400	5,900	970		
Ontario	2,080	210	2,480	400	2,405	600		
Western	1,980	0	3,360	200	3,200	420		
Total	**11,094**	**210**	**13,800**	**1,000**	**13,605**	**2,285**	—	—
Deinked as % of total		1.9%		2%		17%		
Total North America	**17,196**	**1,422**	**21,600**	**3,000**	**22,000**	**5,500**	**6,800**	**9,200**
Deinked as % of total		8.3%		16%[1]		25%	31%	40%

1. Assumes that those mills with deinking facilities are operating at 100% capacity, while the overall industry operating rate will be 87%.
Source: New York State Newspaper Recycling Task Force, Projections from Andover International Associates.

tion takes the same turns. Thus, maintaining supplies of wastepaper is a matter of making prices an incentive to spur collections.

Long term, though, wastepaper prices have been downward in real terms, as has also been the case with market pulp. The highest-quality grades, though, are the exception to this rule in the U.S. Jaakko Pöyry expects that prices for grades such as OCC and high-grade deinking will strengthen relative to other grades and will probably rise in real terms. And prices of ONP and magazines—which will be in abundant supply—will remain depressed, leading more mills to find ways to utilize these grades to a greater degree than they are now.

Overall, though, there is some evidence that prices will be more stable in the future, Jaakko Pöyry notes in its study. Mills will become more involved with the collection of wastepaper through their interests in wastepaper merchants, and new storage systems may reduce price fluctuations.

Throughout the world, wastepaper has common sources and collection systems are largely similar. Basic sources of preconsumer wastepaper are printers and converters. And prime sources of postconsumer wastepaper are retailers, offices, industry, and households.

Preconsumer waste is normally the most valuable, as it is of a largely consistent and often clean quality and is available on a regular basis. Virtually all preconsumer waste is already collected and recycled in the industrialized countries.

Postconsumer waste accounts for the great bulk of all wastepaper collected in every region. The recovery of waste from retailers (principally OCC) is normally quite high, as is the recovery of wastepaper from industry whenever it is suitable for recycling. However, the recovery of office waste is often still low, as is the recovery of household wastepaper—despite current progress with source-separation of ONP and magazines in many countries.

TABLE 10: **Wastepaper prices—major grades ($/short ton, f.o.b. seller's dock, New York).**

	Old newspapers (6)	Corrugated containers (11)	Hard white shavings (30)	Colored ledger (39)
1989				
4Q	$-16.00	$17.50	$355.00	$112.50
3Q	-5.00	20.83	358.33	115.66
2Q	9.16	29.16	358.33	125.00
1Q	17.50	35.00	327.50	127.50
1988				
4Q	35.00	43.33	335.00	119.16
3Q	45.83	55.83	343.33	125.00
2Q	50.00	51.66	323.33	125.00
1Q	58.30	52.50	320.00	122.50
1987				
4Q	55.00	54.17	296.66	112.50
3Q	44.16	70.00	276.66	90.83
2Q	47.50	42.50	276.66	85.83
1Q	40.00	40.00	285.83	78.33
1986				
4Q	25.00	22.50	180.00	79.16
3Q	31.67	45.83	248.33	88.33
2Q	35.00	33.33	210.00	72.50
1Q	30.00	25.00	187.50	72.50
Year-end				
1985	25.00	22.50	180.00	72.50
1984	42.50	37.50	245.00	115.00
1983	42.50	47.50	212.50	112.50
1982	30.00	30.00	200.00	67.50
1981	27.50	27.50	252.50	110.00
1980	45.00	33.00	251.50	127.50

Note: Prices reflect paper and board mill purchase prices, exclusive of delivery charges, and contract rather than premium spot sales. Numbers after each grade correspond to definitions in the current Paper Stock Institute of America Standards & Practices Circular.

Source: *Pulp & Paper Week.*

How will this growth affect the wastepaper business itself? Its structure is certain to change, projects Jaakko Pöyry. The merchant/packer sector will be rationalized. There will be further integration between mills and merchants. In addition, foreign importers will become more involved in the U.S. market. "But the business will be more attractive than in the past and, hopefully, more stable," its study indicates.

Throughout the world, the wastepaper merchants are at the center of the business—collecting, sorting, packing, and marketing wastepaper. They are supported by many small collectors feeding wastepaper in-

Overall, though, there is some evidence that prices will be more stable in the future, Jaakko Pöyry notes in its study.

to merchants' yards and by brokers involved in trading wastepaper rather than collecting and packing.

MILL INVOLVEMENT. Paper and board mills, however, are becoming increasingly involved in the wastepaper business through the acquisition of merchants and specific support of independent merchants. The mills are keen to ensure long-term stability of their wastepaper supplies due to increasing competition, especially in better qualities—hence their interest in acquiring merchant operations. At the same time, stronger financial backing for merchants will improve their ability to invest in new storage and sorting facilities in the future, and with greater control by mills, the demand/supply and price aspects of the wastepaper business may stabilize.

Jaakko Pöyry has forecast the following trends in the structure of wastepaper merchanting in North America:

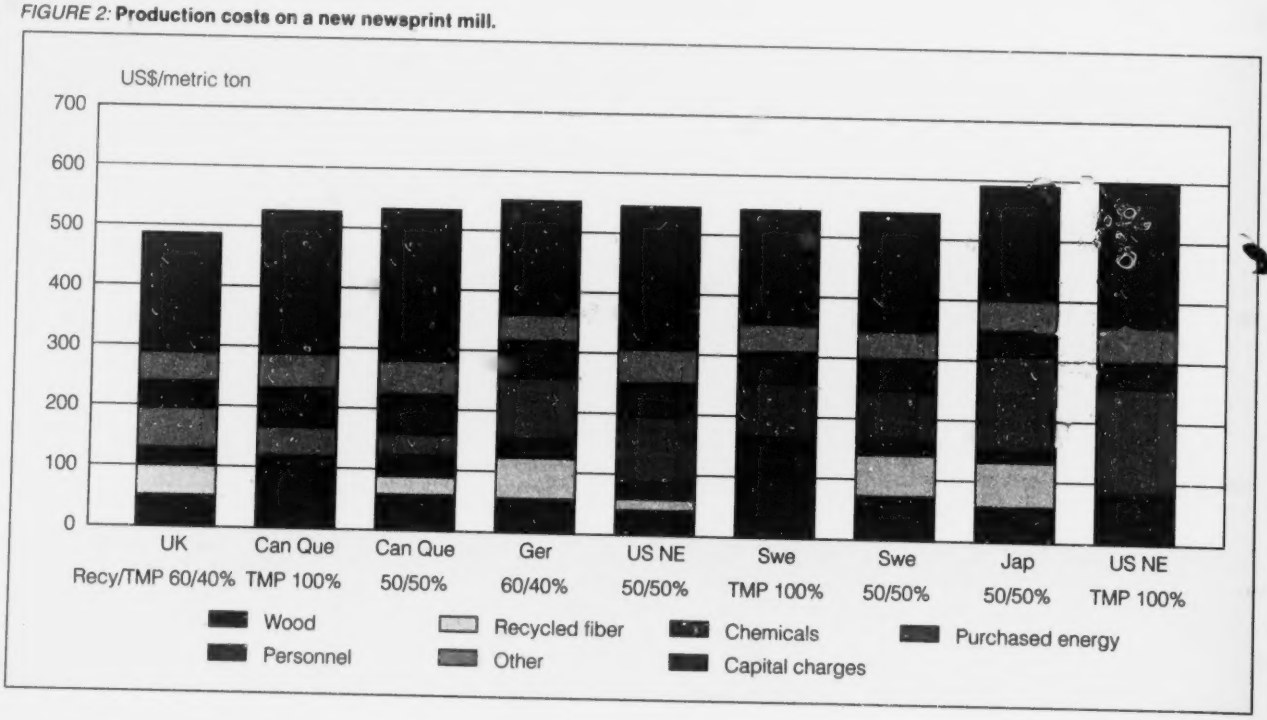
- A limited increase in direct mill ownership of big brokers or merchants in the foreseeable future
- Greater mill involvement with packers—outright control in some cases and special arrangements in other cases
- More foreign buyers will have offices in the U.S., and some could acquire U.S. packers to safeguard their supplies.
- Both municipalities and nontraditional organizations will become more involved with the handling of wastepaper from households.
- Generally, medium-size packers will find life hard and will disappear or be absorbed into bigger groups.

TECHNOLOGY AIDS EXPANSION. Improving technology in the fields of cleaning, deinking, and handling of wastepaper has played an important role in the continuing expansion of wastepaper processing plants and, conversely, can be seen as a major bottleneck for recycled fiber usage as well. But present development work with fiber fractionation and separation handling of those fiber fractions will, in the long term, bring about economically feasible solutions, according to Jaakko Pöyry.

Up-cycling (use of lower-quality wastepaper for production of high-value-added products) has been the major subject of numerous recent technological research efforts. However, to date it has not advanced far enough to be considered economical compared with uses in applications other than primarily industrial.

Hartwig Geginat, president of the European Paper Institute (EPI) and chairman of the executive board of Feldmühle AG, points out, though, that advances in deinking technology alone should enable wastepaper to be upgraded to qualities that were not available just a few years ago. "This should open up completely new fields of application—in the area of superior hygienic paper, for example," Dr. Geginat noted.

FIGURE 2: **Production costs on a new newsprint mill.**



Some key developments in improved secondary fiber processing technology, noted by Jaakko Pöyry, include the following:

- Improvements in stock preparation technology, including deinking, bleaching and fractionation. This is yielding a more homogeneous raw material stock with less impurities and other detrimental particles.
- More technology-driven know how of paper and board mills, enabling them to use specific recycled fiber grades for getting certain properties in end products
- The development of multilayering technology, leading to a more effective use of recycled fiber in different layers of the product, particularly in the manufacture of board and tissue
- Improved runability of the paper machine with a recycled fiber furnish due to modern paper machine technology with closed draws and highly automated process control and measurement, as well as

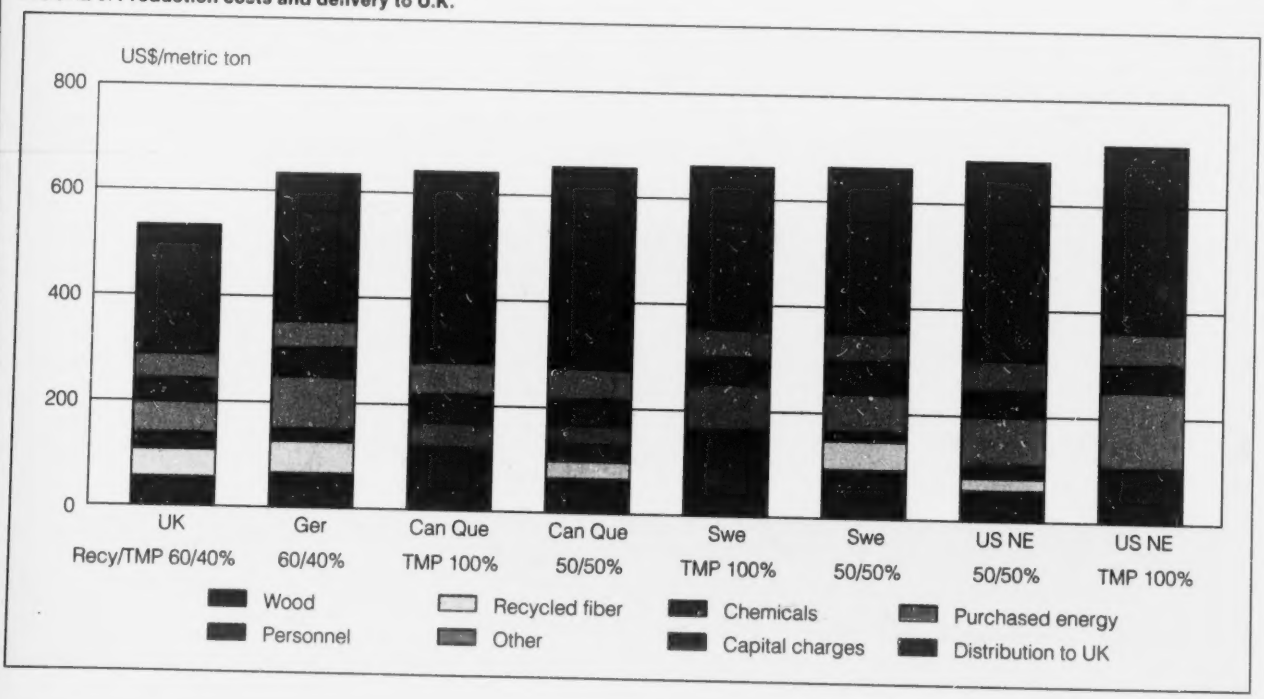
TABLE 12: **U.S. recycled newsprint mills.**

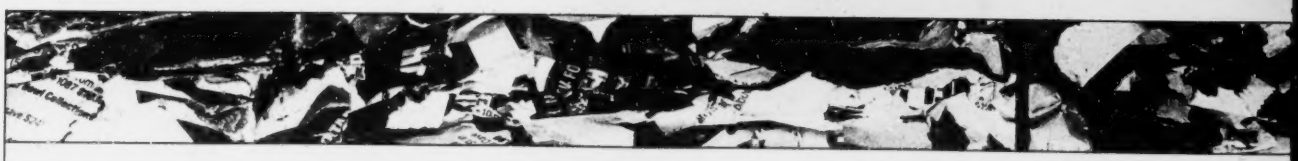
Company	Mill	Capacity (metric tpy)	Recycled content (%)	Publisher equity (%)
U.S.				
F.S.C. Paper Co.	Alsip, Ill.	121,500	100	—
Garden State Paper Co.	Garfield, N.J.	199,500	100	Media General Inc. (100%)
Golden State Newsprint Co.	Pomona, Calif.	122,500	100	—
Manistique Papers Inc.	Manistique, Mich.	56,000	100	—
North Pacific Paper Corp.	Longview, Wash.	704,000[1]	25[2]	—
Jefferson Smurfit Corp.	Newberg, Ore.	350,000	50	The Times Mirror Co. (20%)
	Oregon City, Ore.	217,000	50	The Times Mirror Co. (20%)
Southeast Paper Manufacturing Co.	Dublin, Ga.	415,000[3]	95	Cox Enterprises Inc. (33⅓%) Knight-Rider Inc. (33⅓%) Media General Inc. (33⅓%)
Stone Container Corp.	Snowflake, Ariz.	264,100	60	—
Canada				
Atlantic Packaging Corp.	Whitby, Ont.	136,100[4]	100	—
Quebec & Ontario Paper Co.	Thorold, Ont.	310,000	55	Tribune Co. (100%)

Sources: Newsprint Information Committee, *Pulp & Paper Week.*

1. Includes new 230,000-tpy machine starting up in late 1991.
2. Estimated net recycled content among mill's three paper machines.
3. Includes new 215,000-tpy machine started September 1989.
4. New 136,100-tpy machine starting up mid-1990.

FIGURE 3: **Production costs and delivery to U.K.**





cleaning equipment

• Advances in coating technology and use of pigments. These developments, together with the improved smoothness and surface properties of a recycled-fiber basesheet, will contribute to the increased use of coating, especially in the manufacture of cartonboard.

• Soft-calendering to improve surface properties, especially with a deinked pulp furnish in newsprint manufacture.

Present papermaking technology allows increased use of recycled fiber in standard newsprint (up to 70% without problems in product quality), linerboard and fluting, tissue, and also some cartonboard and packaging paper grades. To a limited extent, the present technology also allows for the use of secondary fiber in uncoated free-sheet grades, coated free-sheet, lightweight coated and supercalendered paper, liquid packaging board, and foodboards.

At Atlantic Packaging Products Ltd.'s Whitby, Ont., mill, a 134,500-metric-tpy newsprint machine that is scheduled to start up late in 1990 is using both washing and flotation in its deinking system. The two-process system is rare in North America (although popular in Europe and Japan) but is becoming the new trend in deinking, as it can process both ONP and coated magazine paper and produce fiber with some beneficial characteristics.

Flotation technology is being used at Smurfit Newsprint Co.'s Oregon City, Ore., mill, Atlantic Packaging's Scarborough, Ont., tissue mill, and Stone Container Corp.'s Snowflake, Ariz., newsprint mill.

HURDLES REMAIN. The primary technical bottlenecks limiting the use of recycled fiber, as specified by Jaakko Pöyry, include the following:

• The high-brightness requirements in printing paper, which make bleaching costs for recycled grades cost-prohibitive. Consumers may have to accept a gray shade.

• The lower-strength properties found in recycled grades. As recycling grows, this will be a problem as stronger fibers will be scarcer.

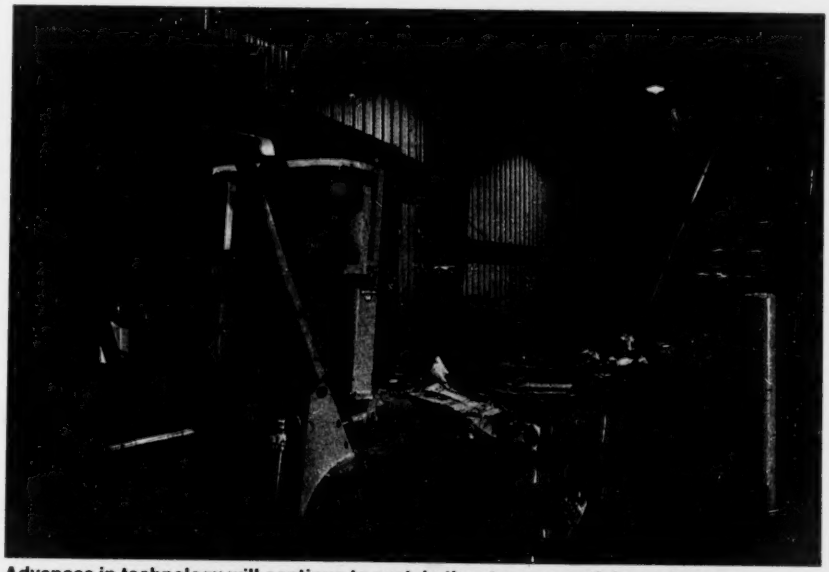
• The aging and yellowing of recycled grades due to high mechanical pulp content. This will cause more problems in maintaining archives for libraries, etc.

• The higher prevalence of stickies, resulting in greater incidence of mechanical problems on the paper machine. This will, potentially, lower operating efficiencies and raise operating costs.

• Environmental concerns caused by the effluents from deinking, including heavy metals, etc. Costs associated with pollution abatement at these mills can be high.

Wastepaper use and processing has a sound environmental basis. It helps to minimize the amount of solid waste by recycling a portion of it. Some of this can be sorted and handled in such a way as to save forests, water, and energy. However, it also generates environmental problems.

The heavy metals in ink waste, one environmental problem, come from certain printing colors. One solution is to substitute organic colors. A second problem is disposing of deinking waste and other wastepaper processing rejects. A possible solution is an incineration system that would optimize the heat economy of wood and waste firing at the same mill. The third environmental concern is landfill disposal of waste from ash after incineration and possible ground-water contamination. Some deinking waste currently is being used for composting.



Advances in technology will continue to sustain the strong growth in wastepaper demand in paper and paperboard production. (Photo courtesy of Inland Container Corp.)

WOODPULP VS RECYCLED FIBER. Cost-competitiveness has played a major role in the increased use of recycled fiber, especially in newsprint and tissue manufacture in Western Europe. In North America, though, newsprint production based on recycled fiber will be driven more by environmental legislation than by cost-competitiveness.

The low cost of old and overissue newspapers and magazines, however, would give a U.S. Northeast producer using 50% recycled fiber and

50% thermomechanical pulp (TMP) a production cost advantage of roughly $40/metric ton compared with a 100% TMP-based newsprint producer in the same region, according to Jaakko Pöyry's estimates (Figure 2).

A Canadian producer in Quebec with a very low energy price and reasonable wood costs would have approximately the same production costs with 100% TMP compared with 50% TMP and 50% recycled fiber (imported from the U.S. Northeast) in the newsprint furnish. However, the Quebec producer would be cost-competitive both in the U.S. Northeast markets (against U.S. producers) and in deliveries to the U.K. (against the Swedish producers) with current exchange rates (Figure 3).

The implications of the increased utilization of recycled fiber for paper and board producers throughout the world are many and involve both opportunities and threats. In general terms, the growing use and acceptability of recycled fiber will allow mills to reduce production costs but will involve significant investment in wastepaper handling, cleaning, deinking, and bleaching equipment, which will often be an additional cost. Jaakko Pöyry expects that there will also be an important marketing opportunity in explaining and capitalizing on the environmental benefits of using recycled-fiber-based grades.

With strong growth in demand and a greater interest on the part of its customers in securing supplies of the correct grades, the wastepaper business has a very bright future. The major threat to the business is that of oversupply of certain grades generated by mandatory separation and collection in North America and potentially in Western Europe. If the market becomes oversupply driven, there is a danger of price and structural breakdown.

Growth in wastepaper demand will spur demand for wastepaper processing equipment and chemicals also. Demand for deinking lines will be particularly strong, noted Jaakko Pöyry. By 2001, 31 million metric tons of wastepaper will be deinked globally, up from about 11 million metric tons currently. Improvements in cleaning and fiber upgrading equipment will show strong growth. Equipment manufacturers increasingly will be looking at the consequences of using recycled fiber on paper machines. ■

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